REMARKS

The allowance of claims 2-8 is noted with appreciation. However, the rejection of claim 10 after it has been indicated as allowed over the exact same art at least twice is very disappointing, especially since the conventional product claim was cancelled only because claim 10 had been allowed. Because that allowance has been withdrawn, previous claim 1 has been reintroduced into this application as new claim 11.

The sole issue remaining in this case is a question of obviousness raised by the rejection of claim 10 (and presumably will also be applied to claim 11) under 35 USC § 103 over Sayre in view of Lauer. This rejection is respectfully traversed. There is no *prima facie* basis for the rejection.

The Examiner is respectfully requested to consider the communication from the inventors which is attached hereto when considering the following comments.

Claim 11 calls for a cork having a printed image on its non-calibrated cylindrical surface, in which the image is polychromatic. Claim 10 recites the product as the product of allowed claim 2. This product is neither taught nor suggested by the combination of references.

The Sayre reference does not teach or suggest the existence of a colored image on a cylindrical cork. Instead, it relates to a heat shrink capsule for closing flange bottle tops whose openings may, for example, be closed by a cork. The Examiner has stated the reference teaches a cork surface with decorations, designs, logos or the like on the surface but fails to "explicitly disclose printing with a polychromatic image on the surface". This is inaccurate and a vast overstatement of the disclosure in the reference. Nothing in that disclosure discloses, explicitly or implicitly, the existence of

a colored decoration, be it monochromatic or polychromatic, nor is there any disclosure, explicit or implicit, of how any decoration was achieved. There is thus no teaching or suggestion in this reference of either color or printing. These decorations, etc., may be on the cork surface by burning a design into the surface or even adhering a printed image on paper to the surface with an adhesive. The Sayre reference is thus deficient in at least two aspects, namely it does not teach or suggest placing anything on the cork surface by printing and secondly, it does not teach or suggest a colored image on the surface, much less a polychromatic image, regardless of how such an image would be applied.

The Lauer reference does not overcome the deficiencies in Sayre. At best, it discloses printing indicia on a non-cork surface. The reference is concerned with a synthetic closure made of plastic, possibly encased in an envelope also made of plastic, which is used as substitute for cork in order to avoid various difficulties encountered with natural cork. All references to cork in Lauer are limited to a description of its limitations or to say the plastic substitute can exhibit an appearance of or the desirable sealing properties of cork. When it is indicated that indicia can be formed on the synthetic material by, *inter alia,* conventional printing techniques, it must be appreciated that this is a reference to printing on plastic. The statement would also be understood by those of ordinary skill in the art as referring to an additional advantage exhibited by the synthetic plastic material which is not exhibited by cork. There is nothing in this reference which teaches or suggests that conventional printing techniques may be used to provide cork with indicia and beyond this deficiency, there is nothing which teaches or suggest that a colored image, much less a polychromatic image, may be achieved by printing on cork.

One reference, at best, says there can be something on the surface of a cork. The other reference says you can print something on a plastic substitute for cork. Any

combination of these references results in substituting plastic for cork and then printing on the plastic, but that is not the claimed invention. Saying it is obvious to combine these references to realize a colored design on cork or a "visual appealing appearance of the cork" is not based on any disclosure in the references but rather is a revision of their teachings achieved by hindsight using the present invention as a template. This is also apparent from the selection, for no stated reason, of conventional printing rather than embossing or etching (Lauer, col. 7, 41-43). Indeed, it is not even obvious-to-try (which is insufficient under § 103 in any event) printing on a cork surface in light of Lauer in that there is nothing which would motivate one skilled in the art to even attempt a conventional printing process with cork. The surface of the synthetic plastic material in Lauer is relatively hard and non-pliable while the surface of cork is relatively soft and pliable, thereby presenting very different problems to one who might seek to apply something to the surfaces.

Nothing in Sayre or Lauer, whether considered alone or in combination, teaches or suggests that a cork having a polychromic image on its non-calibrated cylindrical surface can be achieved.

In light of the foregoing, it is respectfully submitted that this application is now in condition to be allowed and the issuance of a Notice of Allowance is respectfully solicited.

Dated: December 5, 2005

Respectfully submitted,

By Edward A. Meilman

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USPTO
Your Confirmation No.6275 Art Unit No. 2854 - 04/22/2005

VIA
Mr. EDWARD A MEILMAN
Att. Docket No.E4355.0002/P002

RE: US APPL. No. 10/031,592

Dear Mrs. Ferguson,

1. We again object to your decision not to grant the product Claim (of our application entitled **"POLYCHROMATIC PRINTED CORKS AND METHOD FOR MAKING THE SAME"**, as per 35 U.S.C. 103(a). You cite Sayre (U.S. Patent 5,654,022) and Lauer et al. (U.S, Patent 6,616,997).

We would like to emphasize again that the cited two patents are too distant from the technical problems that should be solved when producing a cork with a high quality polychromatic image that is manufactured via the novel **industrial method** for polychromatic printing on cylindrical cork surfaces made of natural cork material and cork mixtures, which method you also accepted to be an invention.

The claimed object of protection in the Sayre patent (U.S. Patent 5,654,022) is not a cork; it is even not only a closure, but rather a decorative capsule made of heat shrinkable foil shaped as a band onto which all graphical elements are preliminary printed. After that the foil band is shaped in the manner shown by the inventor. While the cited patent does say the decorative capsule can optionally be transparent so that decorations, designs, logos and the like can be seen on the cork surface, how those decorations, etc., are put on the cork surface is not described and there is no statement or suggestion that the decorations, etc., may have any colour. It is obvious that this cited patent is irrelevant to the object that we propose in our product claim .

The patent of Lauer et al. (U.S. Patent 6,616,997) too is irrelevant to the object that we propose in our product claim . The object claimed in Lauer et al. (U.S, Patent 6,616,997) is an extruded multi-layer synthetic closure. It is made of synthetic material whose physical and chemical properties differ substantially from those of the natural cork

material. As it is indicated in the text of Lauer et al. (U.S. Patent 6,616,997), the synthetic closure is marked through methods that are conventional in relation to the known art in the field of polygraphic technology. The cited patent does not say that cork can be marked in the same manner. We found that these conventional methods are not appropriate for producing a cork with a high quality polychromatic image on its surrounding surface that is produced under the novel, accepted as an invention by you, **industrial method** for polychromatic printing onto cylindrical surfaces of corks made of natural cork and cork mixtures.

In this sense, **the cork claimed in our product claim with a high quality polychromatic image applied in an industrial manner** is not a product whose production results logically from engineer compiling of the features mentioned in the patents cited by you because neither separately, nor together, do these patents contain the necessary technological possibilities for such realization. Thus, the object claimed in our product claim possesses all features of an invention because it is not only novel and applicable in industry but it also complies with the requirement of an inventive step. It cannot be derived directly from the existing prior art and it was therefore necessary to create a new polygraphic method for polychromatic printing on the surrounding surface of cylindrical noncalibrated products with residual deformation. The new method, the machine for its realization and the product that is produced thereof are pioneer inventions. It is namely due to this fact that the cork claimed was accepted to be an invention. without any doubt by your colleagues, the respected examiners in the following Patent Offices:

Territory	Patent No:	Date of grant:
BG Bulgaria	BG63733	Date: 15.01.2003
EA Eurasia	003449 Bl	Date: 26.06.2003
EP Europe	EP 1200269 Bl	Date: 23.02.2005
CN China	ZL 00810980.X	Date: 06.04.2005

For your reference we are enclosing herewith copies of these patent certificates. Furthermore, in connection with the additionally cited opposed by you patents we would like to state the following:

The deposited Portuguese "Memo" of B AIA (1979-011400) includes printing

pattern simulating wood grain on coloured base coated with clear and washable varnish, is about decoration of flat planks and foil made of the material "cortisite" which is a product from secondary usage of the cork material, but is not cork.

The decoration is done by the offset printing method after a preliminary filling-in of the cork pores with a base or varnish according to the description given by the inventor and the printing of the wood structure on it is not polychromatic printing. In this case we have application of a monochromatic wood pattern onto a background with a specific for some kinds of wood tonality. Since this method is realized onto flat surfaces it is irrelevant to our invention and does not belong to the related art.

The claims of patent No.JP410137442A with an inventor KAMISHITA, title: JIGSAW PUZZLE are connected with the creation of a two-layer, printed on both sides puzzle (paper onto cork foil). The images in this patent are applied onto a **flat** surface too. Due to this it is irrelevant to our invention and does not belong to the related prior art.

Therefore, the additionally cited patents are IRRELEVANT to the claimed object in our product Claim - **"A cork with a polychromatic image printed on its cylindrical surface"** because they do not contain even a single hint as to the character of the technical problems that should be solved upon the industrial realization of this new product.

II. The necessity to study the cork itself as a material and the creation of a method by which a high quality product might be produced explains the absence of such product on the market until the appearance of our invention in spite of the fact that both the consumers and the producers of corks longed for its appearance.

According to the opinions and assessment of leading producers in this business branch all over the world, thanks to our invention the appearance of industrially produced corks made of natural cork material and cork mixtures with a high quality polychromatic images onto their surrounding surface has made a 30-year old dream come true. Our technology for polychromatic printing on cylindrical surfaces of corks made of natural cork material and cork mixtures gives an incomparably much more attractive outer appearance of the products without damaging the, **irreplaceable for the wine industry sealing qualities of the natural cork.** Thus, a new product having new consumer value

is created which product combines the qualities of two separate elements - a cork and a decorative capsule.

Specially for you we will make a detailed analysis of all technological problems that are solved by means of the new technology that we created for the manufacture of this new product - a cork with a high quality polychromatic image on its surrounding surface that is produced through the novel, accepted to be an invention by you too, **industrial method** for polychromatic printing on the cylindrical surface of corks made of natural cork and cork mixtures.

1. What is the existing technological equipment that is used for application of polychromatic images on cylindrical surfaces before the priority date of our application, July 29, 1999.

In the prior art, the machines performing polychromatic printing on cylindrical surfaces had to comply with the following technical requirements and conditions:

- the application of the basic colours is performed in a sequence at separate colour stations;

- it is necessary to maintain a precise angular orientation of the object onto which printing was performed in relation to the printing elements of each basic colour;

- provision of rotational movement with sufficient kinematical precision when rolling the object of printing in the printing element.

2. What are the requirements for the object of printing?

- The object should have a smooth, clean, light-color and geometrically regular surface;

- The object should have the necessary dimensional stability allowing multiple application of force onto it without causing irreversible deformation of its structure or displacementt in the operational position.

CONCLUSION: The prior art methods and machines for production of colour images on the surrounding surface of cylindrical products **are inapplicable for industrial manufacture of corks made of natural cork and cork mixtures because they are non-calibrated products with residual deformation.**

The reasons for this are the specific physical and mechanical properties of the natural cork, and namely:

- Residual (irreversible) deformation of the structure when exercising force;

- Different density and rigidness of separate areas of the processed surface;

- Presence of cavities and rigid elements;

- Impossibility to produce calibrated cylindrical products of natural cork and cork mixtures due to the above reasons.

It is obvious that these structural characteristics of the cork, being a natural material, cannot be controlled or corrected in the manufacture of cylindrical corks because each one of them is a unique combination of the above factors. This is the main reason why the known methods and machines for polychromatic printing on cylindrical surfaces are inapplicable for corks made of natural cork and cork mixtures. Such attempts were made but they ended quite unsuccessfully due to the following reason:

When the printing profile exercises force on the object of printing (corks of natural cork and cork mixtures) uncontrolled position displacement is obtained as a result of the caused residual deformation in the structure of the natural cork.

It is obvious that if the cork passes consequently through all colour stations, as is the case in the present prior art of the printing techniques, the kinematical error between the object of printing and the printing profiles of the separate colours becomes bigger, the colours become displaced as a result of which the synthesizing of a high quality polychromatic image is impossible.

3. Why the contact method is the only one applicable for printing on cork surface?

The experience in this industrial branch shows that only the contact method of the LETTERPRESS PRINTING type has any practical value as regards industrial applicability. The printing profile there is protuberant and thus we have the following advantages:

- Less contamination when working in a dusty environment;

- The printed image is resistant to wear and erasing due to the deep penetration of the ink layer as a result of the pressure exerted by the printing profile (This fact is of great importance for the further technological processing over the surface of the printed corks;

- Big working resource of the printing profile due to the relatively high relief.

4. Why are the non-contact printing methods inapplicable?

The reasons are connected with:

- insufficient geometric precision of the cylindrical surface of the cork - it is non-calibrated;

- strong dustiness of the working environment in the cork processing industry; - relatively low printing speed.

It is impossible to produce a cork with a high quality polychromatic image on its surface through any of the known methods for non-contact printing.

Taking into account all of the above it can be concluded that **when printing on the surrounding surface of corks made of natural cork and cork mixtures the contact method of the LETTERPRESS PRINTING type is the only one having practical value. It is performed by exertion of force onto the object of printing but this causes displacement of the working position and bad quality of the image if the known printing methods are applied.**

5. What is the way to overcome these contradicting requirements?

This is possible through implementing the developed by us method **for simultaneous and direct** application of the basic colours onto the cylindrical surface corks made of natural cork and cork mixtures at the **rotation of the object for 360°**. The method is unique in the polygraph technique and due to this all respected experts, including you as well, accepted it to be an invention along with the unique machine for its performance. The method and the machine are in conformity with the specific physical and mechanical properties of natural cork. It is obvious that the new product, and namely the cork produced under the method as per our product claim , is also an invention because thanks to our invention activities, for the first time appeared an industrially produced cylindrical non-calibrated product with a high quality polychromatic image printed on its surrounding surface.

6. What are the advantages of our new technology?

- Possibility to synthesize a precise polychromatic image onto the surrounding surface of non-calibrated cylindrical products made of materials, whose structure is characterized by residual deformation upon exertion of mechanical impact, due to the **absence of kinematical error during the simultaneous rotation of all printing rollers and the object of printing, at one working position upon rotation of 360°**;

- Improved balance of the force exerted by the printing rollers in relation to the object of printing due to their opposite location;

- Usage of a protruding printing profile of the LETTERPRESS PRINTING type as the most appropriate for working on cork surface in combination with the possibility for **simultaneous, direct and precise** printing of all basic colours.

Dear Mrs. Ferguson,

We sincerely hope that these technical explanations showing categorically that the cork with the industrially printed high quality polychromatic image on its cylindrical surface is an invention **produced through a unique technology of two inventions (method and machine)**. We will be exceptionally satisfied if the above explanations are helpful to you as well as to the Institution that you represent in taking a final technically motivated decision acknowledging the cork as per the product claim as an invention too.

Please find enclosed some information as regards our inventions and the factory where they were implemented.

We remain at your disposal for any questions that may arise.

Sincerely yours,

Ivailo Stanimirov
Inventor,
Owner of CORTEC OOD

M.Sc.Eng. Zdravko Geshev
Inventor,
Director of CORTEC OOD

(19) Europäisches Patentamt
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(54) POLYCHROMATIC PRINTED CORKS AND METHOD FOR MAKING THE SAME

MEHRFARBIG BEDRUCKTE KORKEN UND VERFAHREN ZU DEREN HERSTELLUNG

BOUCHONS DE LIEGE A IMPRESSION CHROMATIQUE ET LEUR PROCEDE DE FABRICATION

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(56) References cited:
EP-A- 0 365 135
DE-A- 2 819 364
US-A- 5 641 573
WO-A-96/34806
DE-A- 19 807 924
US-A- 5 692 629

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Description

FIELD OF THE INVENTION

[0001] The invention is referred to cork, method and machine for printing of polychromatic images on corks and ink cartridge of the machine for printing of polychromatic images, applicable in the manufacture of corks and in polygraphy, especially for simultaneous printing of various colours at making polychromatic images on cylindrical items made of cork, rubber, paper, cardboard, etc.

BACKGROUND OF THE INVENTION

[0002] A pattern cork with monochromatic image is known in the art and widely used.

[0003] A cork with polychromatic image on it is not known in the art.

[0004] A method and a machine for printing of polychromatic images on the surface of a cylindrical item are known in the art wherein the item successively passes through different sections for each colour printing. Colour separation to i colours is previously made, which allows the formation of a polychromatic image by using various basic colours, i.e. the number of colours i = 2 to *n*. On every *i* section the item is positioned to the printing element, i.e. printing roller, that sets on the respective colour. In these cases an additional reorientation of the item is additionally made for the exact adjustment of the next colours on the image already placed. The corresponding inks from corresponding ink cartridges are guided through transporting rollers to the work sectors of the printing rollers. Each roller has a non operating sector that prevents from laying on the images at full turn of the printed cylindrical surface [1].

[0005] A shortcoming of the known method and machine for printing of polychromatic images on the surface of a cylindrical item is that these are intended for pattern items with calibrated and fixed dimensions. that is why their use for polychromatic printing over non calibrated cylindrical items of cork, rubber, paper, cardboard and others leads to a low quality printing due to the impossibility these items to be reoriented precisely from sector to sector.

[0006] A method and a machine for monochromatic printing of images over cylindrical items is known wherein the image is placed by means of monochromatic printing, including thermoprinting.

[0007] A shortcoming of the known method and machine for monochromatic printing of images over cylindrical items is that for printing polychromatic images on the cylindrical items it is necessary to transfer them successively to various machines for monochromatic printing observing measures for exact positioning. That is why their use for polychromatic printing on non-calibrated items of cork, rubber, paper, cardboard, etc. leads to low quality printing, because it results impossible to reorientate these items with precision from machine to machine.

[0008] An ink cartridge for printing images is known in the art, consisting of internal cylindrical vertical ink container with a vertical row of tangential nozzles of one of its sides. A vertical agitator in the container is touching closely its frontal surface to the inner surface of the deposit and at rotating with each turn force the pushing of ink portions through the nozzles. The revolutions of the agitator determine the ink output through the nozzles, for which the change of the desired output is effected replacing the operating kinematic couple of gears in off position. In order to maintain the necessary high quality ink layer, the container should be always full to the level of the upper nozzle. So the container should be continuously refilled with ink. The cylindrical volume of the container is placed in a prismatic shell, fixed to a rotating plate. The nozzles are placed in this shell and from its head the ink is passed to transporting rollers.

[0009] A disadvantage of the known ink cartridge is that it gives a low quality print when the ink level in the ink cartridge falls under the critical level of the upper nozzle. This makes it necessary to keep up a relatively large quantity of ink in the cartridge, which is lost when a cleaning and adjustment of the ink cartridge is to be made. Another shortcoming is the rough distribution of the ink, because it is impossible to set them closer at their linear positioning under a determined constructive minimum of the distance between the nozzles. These disadvantages make the known nozzle difficult to apply in machines for polychromatic printing on non-calibrated cylindrical items made of cork, rubber, paper, cardboard, etc.

[0010] Task of the invention is to create an industrially made cap with a high quality polychromatic image.

[0011] Task of the invention is to create a method and a machine for high quality printing of polychromatic images on cork.

[0012] Task of the invention is to create an ink cartridge for polychromatic printing machine for corks with high quality delivery of the ink.

TECHNICAL DESCRIPTION

[0013] This task is solved by creating a cork with colours forming a polychromatic images on its cylindrical surface.

[0014] A method for printing of polychromatic images on cork is created, wherein colours separation has previously been made, that by using n basic colours allows the formation of polychromatic image. The corks are delivered to an operating zone, and the corresponding inks according to the number of the basic colours are conducted to printing rollers by means of transfer rollers. By oscillation, inks are spread over the cylindrical surface of the cartridges for the achievement and the maintenance of a regular ink layer. Corks are successively supplied one after the other vertically in the operating zone

by gravitation. The cork that will be printed is fixed with its axis in vertical position with the possibility of unlimited rotation around the axis of its cylindrical surface, establishing simultaneous contact with radially placed fixing devices along the effective diameter of the cork, by which all fixing devices come into contact in their corresponding contact points thus eliminating the deviations in the cylindrical shape of the surrounding surface of the cork. Then all printing rollers with diameter equal to the diameter of the cork enter into simultaneous contact with the cylindrical surface at the level of the effective diameter of the cork. Follows a simultaneous rotation of the cap at one revolution by the fixing devices, that make the turn along with the printing rollers at equal peripheral speed in their contact points with the cork surface. All printing rollers spread simultaneously the print of the corresponding colour on the colour zone of the cork surface corresponding to each roller, according to the previous colour separation, and at the end of the turn, the polychromatic image on the surface of the cork is fully made. Then all printing rollers and fixing devices are drawn back from the cork; its axis is released and is pulled back from the operating zone. In the interval to the next loading of the operating zone, the printing rollers make contact with the transporting rollers to cover their printing relief with the corresponding ink colour, and during the printing interval, when the printing rollers are not in contact with the transporting rollers, the latter make contact with intermediate rollers that are in constant contact with the supply surface of the corresponding ink cartridges for each colour and transfer ink to the corresponding intermediate rollers during the whole rotation of each ink cartridge 4_i. All the time, the thickness and regularity of the ink layer on its transferring surface is additionally maintained within the normal range by oscillating spread. The axis of at least one printing roller during the printing process is fixed strongly in radial position to the cork, and the axis of the remaining printing rollers exercise a selective radial pliability to the cork surface.

[0015] According to the method it is possible that the axis of all printing devices make selective radial pliability to the cork surface.

[0016] A polychromatic image printing machine on cork is also created, consisting of *n* printing rollers, ink cartridge, fixed to the base of the machine, and transferring, and intermediate rollers, wherein *n* is the number of colours of the colour separation. Over the operating zone there is a vertical floating magazine, and under the operating zone there is an orifice to a chute. A mobile vertical support with vacuum catch of its upper edge is aligned to the axis of the operating zone and passes through the orifice, an in upper end position contacts the cork with the vacuum catch, and in the lower end position is under the level of the orifice. Thus m fixing rollers are placed vertically with rotation axis parallel to the axis of the operating zone. In printing mode, the printing roller and the fixing rollers are positioned to the effective diameter of the cylindrical surface of the cork. The axis of at least one printing roller is fixed firmly in radial position to the cork. The axis of the other printing rollers have a selective radial pliability to the cork surface, and the printing rollers are not in contact with the transporting rollers, the latter being in contact with the intermediate rollers, that are in permanent contact with the spreading surface of the corresponding ink cartridges for each colour. In recharging mode, all printing rollers and fixing rollers are set aside the cork, the printing rollers are in contact with the corresponding transporting rollers, and the latter are not in contact with the intermediate rollers. Every ink cartridge has an oscillating roller with axis parallel to the axis of the ink cartridge, and outer surface being in permanent contact with the spreading ink cartridge surface. The axis of this oscillating roller is connected to the axis of the worm of a worm reductor, its worm-wheel being connected to an eccentric lever fixed to a support of the oscillating roller. The axis of every fixing roller is articulated through a slide, which is placed into a channel formed by support sectors, and a leading roller, fixed to the lower part of the slide, is placed into a guiding channel in rotating leading synchronized disk which rotation axis fits in the axis of the operating zone. A chain wheel fixed to the synchronizing disk by first leading chain is connected to the engine axis providing radial movement of the pressing rollers to and from the effective diameter of the cork. The axis of every pressing roller under the slide is articulated in the internal part of an arm, which external end is articulated to an arm. freely articulated on a central axis, articulated in the carcass of the machine, wherein the central axis is articulated along a second axis in which lower end are located two gear-wheels, and in their upper end is located a gear-wheel, that through a second chain is connected to a gear-wheel, fixed to the axis of the printing head. An engine for rotation of one cycle by third chain is connected to the gear wheels of all second axis, which lower gear-wheels through their corresponding fourth chains are connected to lower gear-wheels on axis, positioned along the axis in the axis of the articulations between the arms, upper gear wheels of the axis are connected with fifth chains to their corresponding gear-wheels in the lower end of the axis of the fixing rollers. At least one central axis is connected to the corresponding leading fork in which channel is located a pin, eccentrically positioned to the axis of the engine for putting it in motion. To every central axis is fixed a curved arm support for the corresponding printing roller, articulated in its curved edge, the arms being kinematically connected and synchronized thorough their corresponding gear-wheels, fixed to the central axis and wrapped by a sixth chain. A supporting fork is freely articulated under every arm support towards its central axis, an eccentric stop being installed to the fork, being the arm of the stop articulated to the arm support. A leading pneumatic cylinder is articulated between the fork and the arm. A fork for the intermediate roller and the sup-

port, made as a fork, for the oscillating roller are articulated to the fork, and the rollers placed over them are constantly pressed to the cylindrical surface of the ink cartridge by means of a spring between both forks.

[0017] It is possible that in the machine for printing of polychromatic images on cork all central axis grasped by the sixth chain to be connected through it directly to the axis of the oscillating engine.

[0018] It is possible that in the machine for printing of polychromatic images on cork all gear belt washers of the ink cartridges to be grasped by a gear belt, connected through a support roller with a gear belt wheel to the engine axis for setting them in motion.

[0019] It is possible that in the machine for printing polychromatic images on cork the magazine consists of *j* guides, forming a vertical channel, and every guide has at any edge one adjustable support, and at least one of these guides is mobile and is provided of a guiding element, its internal surface having a projection for contact with the cork that is on the exit of the vertical channel.

[0020] It is possible that every adjustable support consist of slide for connecting to the corresponding guide, pressed by a spring into a cylinder and supporting with its head an adjusting screw.

[0021] An ink cartridge is created for machine of polychromatic image printing on corks, consisting of shaft and vertical tank of internal cylindrical volume for the ink and nozzles on its wall. The vertical tank is a cylinder and is placed axially to the head of the shaft. The nozzles are radial and are symmetrically positioned along *N* screw lines, regularly spread over the tank surface. It has an axial core with the form of two-stage cylinder, having a smaller diameter and forming a peripheral hollow ring with the inner surface of the tank, and its second stage has a diameter equal to the inner diameter of the cylindrical volume with a small installation gap and inner chamber with the shape of an open frustum of a cone and slots to the hollow ring. On the tank and the chamber there is a lid with orifice in the center.

[0022] An advantage of the cork is that it has a high quality polychromatic image an that is industrially made.

[0023] An advantage of the method and the machine for printing polychromatic images on cork is that they provide high quality printing.

[0024] An advantage of the ink cartridge for machine of printing polychromatic images on cork is that it provides a high quality ink supply.

DESCRIPTION OF THE FIGURES ATTACHED

[0025] The invention is clarified in details with and example of the cork. the machine that makes effective the method for printing polychromatic images on cork and ink cartridge for the machine for printing polychromatic images, shown on the figures, wherein:

Figure 1 is colour picture of a number of corks with polychromatic images on them.

Figure 2 is principal scheme of the elements distribution in the operating zone of the machine while printing.

Figure 3 is a drawing of the machine while printing.

Figure 4 is drawing of the machine while changing the cork.

Figure 5 is a frontal view of the machine elements while printing with a rotation trajectory of the printing rollers movement.

Figure 6 is a frontal view of the elements of the same machine while the cork is changed.

Figure 7 is a frontal view on the distribution of the fixing elements while printing.

Figure 8 is a transverse section of the machine along AA of Figure 7.

Figure 9 is a scheme of the elements in the machine at a linear trajectory of printing rollers movement.

Figure 10 is a section of the ink cartridge.

Figure 11 is a unfold of the cylindrical surface of the ink cartridge with the nozzles spread on it.

EXAMPLE

[0026] The corks 1 on fig. 1 are with colours 2, forming a printed polychromatic image 3 on their cylindrical surface.

[0027] The polychromatic image printing machine on cork 1 on the figures consists of printing rollers 6_i, i = 1 to *n*, an ink cartridge 4_i. fixed to the base of the machine, and transferring 5_i, and intermediate 8_i rollers, wherein *n* is the number of colours 2 of the colour separation. Over the operating zone there is a vertical floating magazine 9, and under the operating zone there is an orifice 10 to a chute 11. A mobile vertical support 12 with vacuum catch 13 of its upper edge is aligned to the axis of the operating zone and passes through the orifice 10, an in upper end position contacts the cork 1 with the vacuum catch 13, and in the lower end position is under the level of the orifice 10. Fixing rollers 7_j where j = 3 to *m* are placed vertically with rotation axis parallel to the axis of the operating zone. In printing mode, the printing rollers 6_i and the fixing rollers 7_j are positioned to the effective diameter of the cylindrical surface of the cork 1. The axis of at least one printing roller 6 is fixed firmly in radial position to the cork 1. The axis of the other printing rollers 6 have a selective radial pliability to the cork 1 surface, and the printing rollers 6_i are not in contact with the transporting rollers 5_i, the latter being in contact with the intermediate rollers 8_i, that are in permanent contact with the spreading surface of the corresponding ink cartridges 4_i for each colour. In recharging mode, all printing rollers 6_i and fixing rollers 7_j are set aside the cork, the printing rollers 6_i are in contact with their corresponding transporting rollers 5_i, and the latter are not in contact with the intermediate rollers 8_i. Every ink cartridge 4_i has an oscillating roller 14 with axis parallel to the axis of the ink cartridge 4, and outer surface being in permanent contact with the spreading ink cartridge 4

surface. The axis of this oscillating roller 14 is connected to the axis of the worm 15 of a worm reductor 16, its worm-wheel 17 being connected through an eccentric lever 18 fixed to a support 19 of the oscillating roller 14. The axis of every fixing roller 7 is articulated through a slide 20, which is placed into a channel 21 formed by support sectors 22, and a leading roller 23, fixed to the lower part of the slide 20, is placed into a guiding channel 24 in rotating leading synchronized disk 25 which rotation axis fits in the axis of the operating zone. A chain wheel 26 fixed to the synchronizing disk 25 by first leading chain 27 is connected to the engine axis 28 providing radial movement of the pressing rollers 7 to and from the effective diameter of the cork 1. The axis of every pressing roller 7 under the slide 20 is articulated in the inner edge of an arm 29, which outer end is articulated to arm 30, freely articulated on a central axis 31, articulated in the carcass of the machine, wherein the central axis 31 is articulated along a second axis 32 in which lower end are located two gear-wheels 33 and 34, and in their upper end is located a gear-wheel 35, that through a second chain 36 is connected to a gear-wheel 37, fixed to the axis 38 of the printing head 6. An engine for rotation of one cycle 39 by third chain 40 is connected to the gear wheels 33 of all second axis 32, which lower gear-wheels 34 through their corresponding fourth chains 41 are connected to lower gear-wheels 42 on axis 43, positioned along the axis in the axis 44 of the articulations between the arms 29 and 30, upper gear wheels 45 of the axis 43 are connected to fifth chains 46 to their .corresponding gear-wheels 47 in the lower end of the axis of the fixing rollers 7. At least one central axis 31 is connected to the corresponding leading fork 48 in which channel 49 is located pin 50, eccentrically positioned to the axis of the engine 51 for putting it in motion. To every central axis 31 is fixed a curved arm support 52 for the corresponding printing roller 6, articulated in its curved edge, the arms 52 being kinematically connected and synchronized thorough their corresponding gear-wheels 53, fixed to the central axes 31 and wrapped by a sixth chain 54. A supporting fork 55 is freely articulated under every arm support 52 towards its central axis 31, an eccentric stop 56 being installed to the fork, being the arm 57 of the stop articulated to the arm support 52. A leading pneumatic cylinder 58 is articulated between the fork 55 and the arm 52. A fork 59 for the intermediate roller 8 and the support 19, made as a fork 60, for the oscillating roller 14 are articulated to the fork 55, and the rollers 8 and 14 placed over them are constantly pressed to the cylindrical surface of the ink cartridge 4 by means of a spring 61 between fork 59 and fork 60.

[0028] It is possible that in the machine for printing of polychromatic images on cork 1 all central axis 31 grasped by the sixth chain 54 to be connected through it directly to the axis of the oscillating engine 51.

[0029] It is possible that in the machine for printing of polychromatic images on cork 1 all gear belt washers 62 of the ink cartridges 4 to be grasped by a gear belt 63, connected through a support roller 64 with a gear belt wheel 65 to the engine axis 66 for setting them in motion.

[0030] It is possible that in the machine for printing polychromatic images on cork 1 the magazine 9 consists of various guides 67_j, forming a vertical channel 68 , and every guide 67 has at any edge one adjustable support 69, and at least one of these guides is mobile and is provided of a guiding element 70, its internal surface having a projection 71 for contact with the cork 1 that is on the exit of the vertical channel 68.

[0031] It is possible that every adjustable support 69 consists of slide 72 for connecting to the corresponding guide 67, pressed by a spring 73 into a cylinder 74 and supporting with its head an adjusting screw 75.

[0032] The ink cartridge on figures 10 and 11 for machine of polychromatic image printing on cork 1 consists of shaft 76 and vertical, tank 77 of internal cylindrical volume 78 for the ink 79 and nozzles 80 on its wall. The vertical tank 77 is a cylinder and is placed axially to the head of the shaft 76. The nozzles are radial and are symmetrically positioned along *N* screw lines, regularly spread over the tank surface 77. It has an axial core 81 with the form of two-stage cylinder, its stage 82 having a smaller diameter and forming a peripheral hollow ring 83 with the inner surface 77 of the tank, and its second stage 84 has a diameter equal to the inner diameter of the cylindrical volume 78 with a small installation gap and inner chamber 85 with the shape of an open frustum of a cone and slots 86 to the hollow ring 83. On the tank 77 and the chamber 85 there is a lid with orifice in the center.

APPLICATION OF THE INVENTION

[0033] he machine performing the method for printing of polychromatic images on cork is as follows:

[0034] According to the method for printing of polychromatic images on cork 1 a colour separation is previously made, which allows by using various basic colours 2_i where i = 2 to *n* to obtain a polychromatic image 3.

[0035] Initially the magazine 9 is charged with a vertical column of corks 1 (figure 3), the guiding element 70 through its projection 71 of the arm 67 is pressing the lowest cork 1 and prevents their fall by gravitation.

[0036] The mobile vertical support 12 is in upper position and its vacuum catch 13 is at a distance equal to one length of the cork 1 from the head of the lower cork 1 and the magazine 9. The channel 68 adjustment for the corresponding size of corks 1 is effected by the adjusting supports 6 by rotating their adjustable screws 75, that by establishing a frontal contact with the slides 72, under the action of the springs 73 in the cylinders 74 leave a different radial gap of the cork 1 flow in the vertical channel 68. They also provide the alignment of this flow to the axis of the operating zone. The adjusting roll-

ers 7 and the printing rollers 6 are opened and allow free displacement of the corks 1 along the axis. When the leading element 70 draws laterally the lower part of the arm 67 with the projection 71, the latter releases the whole column of corks and the lower cork 1 falls over the head of the vacuum catch 13. Then (figure 7) through the engine 28, the first chain 27, the gear-wheel 26, the leading synchronizing disk 25, the leading rollers 23, displacing along the channels 24, and the slides 20, displacing in the channels 21, formed by the sectors 22, the fixing rollers 7 displace radially in a synchronic way until a contact with the surface of the cork 1 is established along its effective diameter, i.e. along the diameter providing a simultaneous contact of all fixing rollers 7 with the cork 1 surface. This is to overcome the possibility of displacement of the cork 1 rotation axis during the printing process, due to the deviation and the cylindric shape. Its rotation axis coincides with the axis of the machine operating zone. While the fixing rollers 7 press the cork 1, under their action it also rotates, which helps for its precise positioning in the operating zone. After the fixation is over, the leading element 70 (figures 3 and 4) sets back the lower part of the arm 67 with the projection 71, which presses the next cork 1, that serves as upper support of the cork 1 in the operating zone and is ready for the next loading. The engine 28 is oscillating and is operated on a previously determined angle, corresponding to the cork 1 diameter, after which it stops.

[0037] During the fixation (figures 5 and 6) under the action of the leading pneumatic cylinder 58 the fork 55 is displaced along with the transporting rollers 5, which get separated from the intermediate rollers 8 and establish a contact with the printing rollers 6. This contact is of previously determined penetration depth of the printing profile of the printing rollers 6 in the rubber surface of the transporting rollers 5. This is made by the arm 57 and the eccentric stop 56. Then the engine 39 through its third leading chain 40, the gear wheels 33 on the second axis 32 with the gear wheels 35, the second chain 36, the gear wheel 37 and the axis 38 turns the printing rollers 6 at two cycles until the ink is fully spread over their printing profiles with ink of the transporting rollers 5 and then stops (figure 7).

[0038] In order to perform the printing (figure 7) the engine 51, through the roller 50 on its axis, the fork 49 and the arm 48 rotates one of the central axes 31, and the remaining axes 31 are rotated in a synchronous way by gear wheels 53 and the sixth chain 54. The process is effected until the printing heads 6 reach the effective diameter of the cork 1 in the operating zone. Meanwhile (figure 5) the pneumatic cylinders 58 displace the forks 55 with the transporting rollers 5 to the intermediate rollers 8 until a contact with their surface is established. The engine 51 is oscillating and rotates to a previously formulated angle the printing rollers 6 for establishing their contact with the cork 1 along the effective diameter and stops.

[0039] The ink cartridges 4 (figure 10) are in a continuous rotation (figures 3, 4, 7), effected through the engine 66, the gear belt washer 65, grasping the gear belt 63 and the corresponding gear belt washers 62 and the shafts 76. Thus the ink 79 under the action of the centrifugal force passes from the internal chamber 85 of the vertical tank 77 through the slots 86 in the peripheral ring hole 83, formed by the difference in the diameters of the stages 84 and 82 of the core 81, and passes through the nozzles 80. The difference in the diameter of the stages 84 and 82 is selected in such a way that the ink flow is not regulated at any operating mode of the machine. The sections of the nozzles 80 is in accordance with the ink viscosity 79 and prevents its free flow under a defined value of the cycles. The distribution of the nozzles 80 (figure 11) guarantees a regular and continuous supply of ink 79 to the spreading ink cartridge 4 surface. On this surface, by a continuously rotating and oscillating roller 14 is effected the regular distribution of the ink 79. The oscillating roller 14 is operated by the ink cartridge 4 (figures 3 and 4), the worm 15, the worm wheel 17 of the reductor 16 with the lever 18 to the support 19. The air pressure of the chamber 85 should be equal to the atmospheric for providing a precise adjustment of the flowing ink 79, which is made through the orifice 88 of the cork 87.

[0040] During the contact of the ink cartridge 4 surface with the intermediate roller 8 surface the ink 79 is transferred to it. As the intermediate rollers 8 are in a continuous contact with the transporting rollers 5 the ink is transferred to their surface too.

[0041] The maintaining of a constant contact between the surfaces of the ink cartridge 4, the intermediate roller 8, articulated on the fork 59 and the oscillating roller 14 is effected by the spring 61, connecting arms 59 and 60.

[0042] After rollers 6 have entered into contact with cork 1, the polychromatic printing is effected, all printing rollers 6 and fixing rollers 7 are rotated unidirectionally in a synchronous way by the engine 39. During the printing process the cork 1 makes a full cycle (figure 2), after which the engine 39 stops. The rotation is transferred from the engine 39 through the third chain 40, the gear wheels 33, 34 and 35 over the axes 32, the movement being distributed towards the fixing rollers 7 (figure 7) through the gear wheel 34, the fourth chains 41, the wheels 42 and 45, rotating along with the axes 43, articulated in the axes 44, forming the articulation between arms 29 and 30, the fifth chains 46, the gear wheels 47 to the fixing rollers 7, and the printing rollers 6 (figure 7) through the gear wheels 35, the second chains 36, the gear wheels 37 over the axes 38 of the printing heads 6.

[0043] As the movement is synchronous, all printing rollers 6 are making their corresponding colour 2 imprint simultaneously on the cork surface 1 in their corresponding colour zone, according to the previously made colour separation, and thus form a polychromatic image 3 on the cork 1 surface. This is illustrated on figure 2 where the points a, b, c, d indicated for better understanding on all rotating elements and the cork are posi-

tioned at equal angle intervals and during their rotation are always in contact with the same points of cork 1.

[0044] When the machine is in a selective pliability mode (figure 5), some of the printing rollers 6 under the action of the external force influence at entering into contact with the cork 1 displace along its surface with a relatively constant pressure within the range of the elastic deformation of the sixth chain 54. Thus the real profile of the cork 1 is followed by the printing rollers 6= Those of the rollers that have no selective pliability, determine the zone of selective pliability.

[0045] In the version of figures 5, 6 the movement of the printing heads to the cork 1 is effected following a circumference trajectory. A version of the machine is possible displacing the printing heads along a linear trajectory (figure 9).

[0046] After the printing is over, the printing rollers 6 and the fixing rollers 7 draw back from the cork 1. This is made by a reverse displacement of the oscillating engines 28 and 51 with their related kinematic chains described above.

[0047] A subpressure in the vacuum catch 13 is formed simultaneously, the cork 1 is hold by it (the figures do not show the vacuum generator). The mobile vertical support 12 slides down through the orifice 10 (figure 4) while the cork 1 heats its rib and falling down the conducting chute 11, leaves the machine.

[0048] Then the subpressure supply to the vacuum catch 13 is turned off, and the vertical support 12 returns to its upper end position and the cycle is repeated again.

[0049] The machine operation is effected by means of standard electronics not shown on the figures.

Claims

1. Method for printing of polychromatic images on non calibrated cylindrical surfaces of items (1), wherein colours separation has previously been made, that by using *i* basic colours, where *i* = 2 to n allows the formation of polychromatic image, the items are delivered to an operating zone, and the corresponding inks according to the number of the basic colours are conducted to printing rollers by means of transfer rollers, by oscillation, inks are spread over the cylindrical surface of the cartridges for the achievement and the maintenance of a regular ink layer **characterized by**, that the items (1) are successively supplied one after the other vertically in the operating zone by gravitation at which the item (1) that will be printed is fixed with its axis in vertical position with the possibility of unlimited rotation around the axis of its cylindrical surface, establishing simultaneous contact with radially placed fixing devices (7*j*) where *j* = 3 to m along the effective diameter of the item (1), by which all fixing devices (7*j*) come into contact in their corresponding contact points thus eliminating the deviations in the cylindrical shape of the surrounding surface of the item (1), then all printing rollers(6*i*) with diameter equal to the diameter of the item (1) enter into simultaneous contact with the cylindrical surface at the level of the effective diameter of the item (1), following a simultaneous rotation of the item (1) at one revolution by the fixing devices (7*j*), that make the turn along with the printing rollers (6*i*) at equal peripheral speed in their contact points with the item (1) surface, while all printing rollers (6i) spread simultaneously the print of the corresponding colour (2*i*) on the colour zone of the item (1) surface corresponding to each roller (6*i*), according to the previous colour separation, and at the end of the turn, the polychromatic image (3) on the surface of the item (1) is fully made, and then all printing rollers (6i) and fixing devices (7*j*) are drawn back from the item (1), its axis is released and is pulled back from the operating zone, at which in the interval to the next loading of the operating zone, the printing rollers (6*i*) make contact with the transporting rollers (5*i*) to cover their printing relief with the corresponding ink colour, and during the printing interval, when the printing rollers (6*i*) are not in contact with the transporting rollers (5*i*), the latter make contact with intermediate rollers (8*i*) that are in constant contact with the supply surface of the corresponding ink cartridges (4*i*) for each colour and transfer ink to the corresponding intermediate rollers (8*i*) during the whole rotation of each ink cartridge (4*i*), and all the time while the rotation of each ink cartridge (4*i*) is taking place, the thickness and regularity of the ink layer on its transferring surface is additionally maintained within the normal range by oscillating spread, being the axis of at least one printing roller (6*i*) during the printing process fixed strongly in radial position to the item (1), and the axes of the remaining printing rollers (6*i*) exercise a selective radial pliability to the item (1) surface.

2. Method for printing polychromatic images on non calibrated cylindrical surfaces of items (1) according to claim 1, **characterized by** that the axes of all printing rollers (6*i*)exercise a selective radial pliability with regards to the item (1) surface.

3. Polychromatic image printing machine on non calibrated cylindrical surfaces of items (1) consisting of printing roller (6*i*), ink cartridge (4*i*), fixed to the base of the machine, transferring and intermediate roller (5*i*, 8*i*), **characterized by** that there are *n*-1 more printing rollers (6*i*), ink cartridges (4i), transferring rollers (5i) and intermediate rollers (8*i*), wherein *n* is the number of colours (2) of the colour separation, and over the operating zone there is a vertical floating magazine (9), and under the operating zone there is an orifice (10) to a chute (11), and a mobile vertical support (12) with vacuum catch (13) of its

upper edge is aligned to the axis of the operating and passes through the orifice (10), and in upper end position contacts the item (1) with the vacuum catch (13), and in the lower end position is under the level of the orifice (10), at which the fixing rollers (7*j*) where *j* = 3 to *m* are placed vertically with rotation axis parallel to the axis of the operating zone, that in printing mode, the printing rollers (6*i*) and the fixing rollers (7*j*) are positioned to the effective diameter of the cylindrical surface of the item (1), the axis of at least one printing roller (6*i*) is fixed firmly in radial position to the item (1), and the axes of the other printing rollers (6*i*) have a selective radial pliability to the item (1) surface, and the printing rollers (6*i*) are not in contact with the transporting rollers (5*i*), the latter being in contact with the intermediate rollers (8*i*), that are in permanent contact with the spreading surface of the corresponding ink cartridges (4*i*) for each colour (2*i*), that in recharging mode, all printing rollers (6*i*) and fixing rollers (7*j*) are set aside the item (1), the printing rollers (6*i*) are in contact with their corresponding transporting rollers (5*i*), and the latter are not in contact with the intermediate rollers (8i), that every ink cartridge (4*i*) has an oscillating roller (14) with axis parallel to the axis of the ink cartridge (4*i*), and outer surface being in permanent contact with the spreading ink cartridge (4*i*) surface, that the axis of this oscillating roller (14) is connected to the axis of the worm (15) of a worm reductor (16), its worm-wheel (17) being connected through an eccentrically fixed lever (18) to a support (19) of the oscillating roller (14), that the axis of every fixing roller (7*j*) is articulated through a slide (20), which is placed into a channel (21) formed by support sectors (22), and a leading roller (23), fixed to the lower part of the slide (20), is placed into a guiding channel (24) in rotating leading synchronized disk (25) which rotation axis fits in the axis of the operating zone, and a chain wheel (26) fixed to the synchronizing disk (25) by first leading chain (27) is connected to the engine axis (28) providing radial movement of the pressing rollers (7) to and from the effective diameter of the item (1), that the axis of every pressing roller (7) under the slide (20) is articulated in the inner edge of an arm (29), which outer end is articulated to arm (30), freely articulated on a central axis (31), articulated in the carcass of the machine, wherein the central axis (31) is articulated along a second axis (32) in which lower end are located two gear-wheels (33) and (34), and in their upper end is located a gear-wheel (35), that through a second chain (36) is connected to a gear-wheel (37), fixed to the axis (38) of the printing head (6), that an engine for rotation of one cycle (39) by third chain (40) is connected to the gear wheels (33) of all second axis (32), which lower gear-wheels (34) through their corresponding fourth chains (41) are connected to lower gear-wheels (42) on axes (43), positioned along the axis in the axes (44) of the articulations between the arms ((29), (30)), upper gear wheels (45) of the axes (43) are connected to fifth chains (46) to their corresponding gear-wheels (47) in the lower end of the axes of the fixing rollers (7j), that at least one central axis (31) is connected to the corresponding leading fork (48) in which channel (49) is located pin (50), eccentrically positioned to the axis of the engine (51) for putting it in motion, that to every central axis (31) is fixed a curved arm support (52) for the corresponding printing roller (6i), articulated in its curved edge, the arms (52) being kinematically connected and synchronized thorough their corresponding gear-wheels (53), fixed to the central axes (31) and covered by a sixth chain (54), that a supporting fork (55) is freely articulated under every arm support (52) towards its central axis (31), an eccentric stop (56) being installed to the fork, being the arm (57) of the stop articulated to the arm support (52), and a leading pneumatic cylinder (58) is articulated between the fork (55) and the arm (52), at which fork (59) for the intermediate roller (8) and the support (19), made as a fork (60), for the oscillating roller (14) are articulated to the fork (55), and the rollers ((8) (14)) placed over them are constantly pressed to the cylindrical surface of the ink cartridge (4) by means of a spring (61) between the fork (59) for the intermediate roller (8) and the fork (60) for the oscillating roller (14).

4. Polychromatic image printing machine according to claim 3, **characterized by** that all central axes (31) covered by the sixth chain (54) are connected through it directly to the axis of the oscillating engine (51).

5. Polychromatic image printing machine according to claim 3, **characterized by** that all gear belt washers (62) of the ink cartridges (4) are grasped by a gear belt (63), connected through a support roller (64) with a gear belt wheel (65) to the engine axis (66) for setting them in motion.

6. Polychromatic image printing machine according to claim 3, **characterized by** that the supplying magazine (9) consists of various guides (67*j*), forming a vertical channel (68), and every guide (67*j*) has at any edge one adjustable support (69), and at least one of these guides is mobile and is provided of a guided element (70), its internal surface having a projection (71) for contact with the item (1) that is on the exit of the vertical channel (68).

7. Polychromatic image printing machine according to claim 3, **characterized by** that every adjustable support (69) consists of slide (72) for connecting to the corresponding guide (67), pressed by a spring

(73) into a cylinder (74) and supporting with its head an adjusting screw (75).

8. Cork (1) with printed polychromatic image on its non calibrated cylindrical surface, **characterized by** that it is produced by means of the method according to claims 1 and 2.

Patentansprüche

1. Verfahren zur Bedruckung mehrfarbiger Abbildungen auf nichtkalibrierte zylindrische Seitenflächen von Gegenständen (1), wobei eine Farbentrennung im voraus getan war, was durch die Nutzung von *i* Grundfarben, wo *i* = 2 bis *n* ist, die Formierung von einer mehrfarbigen Abbildung erlaubt, indem die Gegenstände zur Arbeitszone zugeführt werden, und die entsprechenden Tinten in Übereinstimmung mit der Anzahl der Grundfarben zu den Bedruckungsrollen von Beförderungsrollen zugeführt werden, wobei die Tinten zur Erreichung und Unterhaltung einer gleichmäßigen Tintenschicht über die zylindrischen Seitenflächen der Patronen durch Oszillation ausgebreitet werden, **dadurch gekennzeichnet, dass** die Gegenstände (1) zur Arbeitszone vertical kontinuierlich nacheinander durch Gravitation zugeführt werden, indem der Gegenstand (1), der bedruckt werden wird, durch die Verwirklichung von gleichzeitigem Kontakt mit radial angeordneten fixierenden Einrichtungen (7*j*), wo *j* = 3 bis *m*, dem effektiven Durchmesser des Gegenstandes (1) entlang mit seiner Achse in vertikaler Lage mit der Möglichkeit zu unbegrenzter Drehbewegung um die Achse seiner Seitenfläche herum festgestellt wird, wodurch alle fixierenden Einrichtungen (7*j*) mit ihren entsprechenden Kontaktpunkten in Kontakt treten, was die Abweichungen in der zylindrischen Form von der Seitenfläche des Gegenstandes (1) eliminiert, wonach alle Bedruckungsrollen (6*i*) mit Durchmesser, der dem Durchmesser des Gegenstandes (1) gleich ist, in gleichzeitigem Kontakt mit der zylindrischen Seitenfläche auf dem Niveau des effektiven Durchmessers vom Gegenstand (1) treten, und wonach eine gleichzeitige Drehbewegung des Gegenstandes (1) auf eine Drehung durch die fixierenden Einrichtungen (7*j*) verwirklicht wird, die diese Drehung samt den Bedruckungsrollen (6*i*) mit gleicher Umfangsgeschwindigkeit in ihren Kontaktpunkten mit der Seitenfläche des Gegenstandes (1) machen, wobei alle Bedruckungsrollen (6*i*), laut der vorherigen Farbentrennung, auf die Farbenzone der Seitenfläche des Gegenstandes (1), die jeder Rolle (6*i*) entspricht, ihren Abdruck von der entsprechenden Farbe (2*i*) gleichzeitig auftragen und die mehrfarbige Abbildung (3) auf der Seitenfläche des Gegenstandes (1) am Ende der Drehung völlig gemacht ist, und wonach alle Bedruckungsrollen (6*i*) und fixierenden Einrichtungen (7*j*) vom Gegenstand (1) zurückgezogen werden und dieser seiner Achse entlang befreit und aus der Arbeitszone zurückgezogen wird, wobei die Bedruckungsrollen (6*i*) im Zeitintervall bis die nächste Zufuhr zur Arbeitszone mit den Beförderungsrollen (5*i*) in Kontakt treten, um ihren Bedruckungsrelief mit der entsprechenden Tintenfarbe zu bedecken, wonach, im Bedrukkungszeitintervall, wenn die Bedruckungsrollen (6*i*) mit den Beförderungsrollen (5*i*) nicht in Kontakt sein, die letzten mit den Zwischenrollen (8*i*) in Kontakt treten, mit der speisenden Oberfläche der entsprechenden Tintenpatrone (4*i*) für jeder Farbe die in ständigem Kontakt sind und wärend der ganzen Drehung jeder Tintenpatrone (4*i*) die Tinte zu den entsprechenden Zwischenrollen (8*i*) übertragen, indem, jedesmal, wenn die Drehung jeder Tintenpatrone (4*i*) verwirklicht wird, die Dicke und Gleichmäßigkeit der Tintenschicht auf seiner Beförderungsfläche im normalen Bereich durch oszillierende Ausbreitung zusätzlich unterhaltet werden, wobei die Achse von mindenstens einer Bedruckungsrolle (6*i*) während des Bedruckungsprozesses in radialer Lage dem Gegenstandes (1) gegenüber fest fixiert ist und die Achsen der übriggebliebenen Bedrukkungsrollen (6i) hinsichtlich der Oberfläche des Gegenstandes (1) eine selective radiale Nachgiebigkeit ausüben.

2. Verfahren zur Bedruckung mehrfarbiger Abbildungen auf nichtkalibrierte zylindrische Seitenflächen von Gegenständen (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Achsen von allen Bedruckungsrollen (6i) hinsichtlich der Oberfläche des Gegenstandes (1) selective radiale Nachgiebigkeit ausüben.

3. Mehrfarbige Abbildungen bedruckende Maschine zu Bedruckung auf nichtkalibrierte zylindrische Seitenflächen von Gegenständen (1), die aus Bedrukkungsrolle (6i), zum Maschinenfuß fixierter Tintenpatrone (4*i*), Beförderungsrolle und Zwischenrolle (5*i*, 8*i*) besteht, **dadurch gekennzeichnet, dass** es noch *n*-1 Bedruckungsrollen (6*i*), Tintenpatronen (4*i*), Beförderungsrollen (5*i*) und Zwischenrollen (8*i*) gibt, wo *n* die Anzahl der Farben (2) der Farbentrennung ist, und es über der Arbeitszone ein vertikales schwimmendes Magazin (9) gibt, und es unter der Arbeitszone eine Öffnung (10) zu einer Rinn e (11) gibt, und ein fahrbarer vertikale r Anschlag (12) mit Vakuumgreifer (13) an seinem oberen Rand zur Achse der Arbeitszone ausgerichtet ist und durch die Öffnung (10) durchläuft, wobei dieser Anschlag in oberer Endposition den Gegenstand (1) mit dem Vakuumgreifer (13) berührt und in unterer Endposition unter dem Niveau der Öffnung (10) ist, wobei die fixierenden Rollen (7*j*), wo *j* = 3 bis *m*, mit Dre-

hungsachse parallel der Achse der Arbeitszone vertical angeordnet sind, dass im Bedruckungsbetrieb die Bedruckungsrollen (6i) und die fixierenden Rollen (7*j*) zum effektiven Durchmesser der zylindrischen Seitenfläche vom Gegenst and (1) positioniert sind, die Achse von wenigstens einer Bedrukkungsrolle (6i) in radialer Lage dem Gegenstand (1) gegenüber fest fixiert ist, und die Achsen der anderen Bedruckungsrollen (6i) hinsichtlich der Oberfläche des Gegenstandes (1) mit selectiver radialer Nachgiebigkeit sind, und die Bedruckungsrollen (6i) mit den Beförderungsrollen (5*i*) nicht in Kontakt sind, indem die letzten mit den Zwischenrollen (8*i*) in Kontakt sind, die mit der ausbreitenden Seitenfläche von den entsprechenden Tintenpatronen (4*i*) für jede Farbe (2*i*) in ständigem Kontakt sind, dass im Umladungsbetrieb alle Bedruckungsrollen (6i) und fixierenden Rollen (7*j*) vom Gegenstand (1) zurückgezogen werden, die Bedruckungsrollen (6i) mit ihren entsprechenden Beförderungsrollen (5*i*) in Kontakt sind, und die letzten mit den Zwischenrollen (8*i*) nicht in Kontakt sind, indem jede Tintenpatrone (4*i*) eine oszillierende Rolle (14) mit Achse, die der Achse der Tintenpatrone (4*i*) parallel ist, und mit äußerer Seitenfläche, die mit der ausbreitenden Seitenfläche der Tintenpatrone (4*i*) in ständigem Kontakt ist, hat, wobei die Achse dieser oszillierenden Rolle (14) zur Achse der Schnecke (15) von einem Schneckengetriebe (16) angekuppelt ist, dessen Schneckenr ad (17) durch einen exzentrisch fixierten Hebel (18) zu einer Stütze (19) von der oszillierenden Rolle (14) angekuppelt ist, indem die Achse von jeder fixierenden Rolle (7*j*) durc h ein Gleitstück (20) gelagert, das in einen von stützenden Sektoren (22) formierten Kanal (21) gestellt ist, und eine führende Rolle (23), die zum unteren Teil des Gleitstücks (20) fixiert ist, in einen führende n Kanal (24) in einer drehenden führenden synchronisierten Scheibe (25) gestellt ist, deren Drehungsachse sich mit der Achse der Arbeitszone deckt, und ein Kettenrad (26), das zur synchronisierenden Scheibe (25) fixiert ist, durch eine erste führende Kette (27) zur Motorachse (28) angekuppelt ist, um die radiale Bewegung der Drückungsrollen (7) zu und von dem effektiven Durchmesser des Gegenstandes (1) zu verwirklichen, wobei die Achse jeder Drückungsrolle (7) unter dem Gleitstück (20) am inneren Rande eines Arms (29) gelagert ist, dessen äußeren Rand mit einem Arm (30) gelenkig verbunden, der auf der Zentralachse (31) frei gelagert ist, die im Maschinengehäuse gelagert ist, indem diese Zentralachse (31) einer zweiten Achse (32) entlang gelagert ist, wobei es am unteren Ende dieser zweiten Achse (32) zwei Zahnräder (33) und (34) an seinem oberen End ein Zahnrad (35), dass durch eine zweite Kette (36) mit einem auf der Achse (38) des Bedruckungskopfstücks (6) fixierten Zahnrad (37) verbunden ist, wobei ein Motor zum Drehen auf eine Umdrehung (39) durch eine dritte Kette (40) an den Zahnrädern (33) aller zweiten Achsen (32) angekupelt ist, deren unteren Zahnräder (34) durch ihre entsprechenden vierten Ketten (41) zu den unteren Zahnrädern (42) auf den Achsen (43) angekupelt sind, indem die letzten in den Achsen (44) der Scharnierverbindungen zwischen den Armen ((29, (30)) koaxiall angeordnet sind, und obere Zahnräder (45) der Axen (43) mit fünften Ketten (46) zu ihren entsprechenden Zahnrädern (47) am unteren Ende der Axen der fixierenden Rollen (7j) angek upelt sind, wobei wenigstens eine Zentralachse (31) zur entsprechenden führenden Gabel (48) verbunden ist, in derren Kanal (49) gibt es ein Stift (50), exzentrisch posizioniert der Achse eines Motors (51) gegenüber, um ihn in Bewegung zu setzen, indem eine gekrümmte Armstütze (52) für die entsprechenden an ihrem gekrümmten Ende gelagerten Bedruckungsrolle (6i) zu jeder Zentralachse (31) fixiert ist, indem diese Arme (52) durch ihre entsprechenden zu den Zentralachsen (31) befestigten und von einer sechsten Kette (54) umfaßten Zahnräder (53) kinematisch verbunden und synchronisiert sind, wobei eine Stützgabel (55) unter jeder Armstütze (52) an ihrer Zentralachse (31) frei gelagert ist, und ein exzentrischer Laufbegrenzer (56) auf diese Gabel (55) montiert ist, dessen Arm (57) mit der Armstütze (52) gelenkigweise verbunden ist, und ein führender pneumatischer Zylinder (58) zwischen der Gabel (55) und de m Arm (52) gelenkigweise verbunden ist, indem die Gabel (59) für die Zwischenrolle (8) und die Stütze (19), die als eine Gabel (60) für die oszillierende Rolle (14) ausgeführt ist, zur Gabel (55) gelenkigweise verbunden sind, und die auf ihnen angeordneten Rollen ((8), (14)) zur zylindrischen Seitenfläche von der Tintenpatrone (4) mittels einer Feder (61) zwischen der Gabel (59) für die Zwischenrolle (8) und der Gabel (60) für die oszillierende Rolle (14) ständig gedrückt sind.

4. Mehrfarbige Abbildungen bedruckende Maschine nach Anspruch 3, **dadurch gekennzeichnet, dass** alle durch die sechste Kette (54) umfaßten Zentralachsen (31) durch diese direkt mit der Achse des oszillierenden Motors (51) verbunden sind.

5. Mehrfarbige Abbildungen bedruckende Maschine nach Anspruch 3, **dadurch gekennzeichnet, dass** alle Zahnriemenscheiben (52) der Tintenpatronen (4) durch einen Zahnriemen (63) umfaßt sind, der durch eine Stützrolle (64) mit einem Zahnriemenrad (65) zur Motorachse (66) angekuppelt ist, um diese in Bewegung zu setzen.

6. Mehrfarbige Abbildungen bedruckende Maschine nach Anspruch 3, **dadurch gekennzeichnet, dass** das Speisemagazin (9) aus verschiedenartigen

Führungen (67*j*) besteht, die einen vertikalen Kanal (68) bilden, und dass jede Führung (67*j*) an jedem Rand einen Klemmanschlag (69) hat, und dass wenigstens eine von diesen Führungen fahrbar und mit einem geführten Element (70) ausgerüstet ist, dessen innere Oberfläche eine Vorsprung (71) zum Kontakt mit dem Gegenstand (1), der am Ausgang des vertikalen Kanals (68) ist, hat.

7. Mehrfarbige Abbildungen bedruckende Maschine nach Anspruch 3, **dadurch gekennzeichnet, dass** jeder Klemmanschlag (69) aus einem Gleitstück (72) zur Verbindung mit der entsprechenden Führung (67) besteht, der von einer Feder (73) an einen Zylinder (74) gedrückt ist und mit seinem Kopfstück eine Einstellschraube (75) abstützt.

8. Korken (1) mit einer mehrfarbig bedruckten Abbildung auf seiner nichtkalibrierten zylindrischen Seitenfläche, **dadurch gekennzeichnet, dass** er durch das Verfahren nach Ansprüchen 1 und 2 hergestellt ist.

Revendications

1. Procédé d'impression des images polychromes sur des surfaces latérales cylindriques non calibrées des produits (1) où la séparation des couleurs a été réalisée préalablemant, ce qui permet de former par l'utilisation d'un nombre *i* de couleurs de base, où *i* = 2 à *n*, un image polychrome, en amenant les produits dans la zone de travail et en transférant les encres correspondantes, selon le nombre des couleurs de base, par des rouleaux transférants ver s des rouleaux imprimeurs, en réalisant par oscillation l'étalement des encres sur la surface latérale cylindrique des cartouches afin d'obtenir et de maintenir une couche d'encre régulière, **caractérisé en ce que** les produits (1) sont amenés consécutivement l'un après l'autre par gravitation verticalement dans la zone de travail, en fixant le produit, sur lequel on va imprinter, axialement en position verticale avec la possibilité de rotation illimitée autour de l'axe de sa surface latérale cylindrique et en établissant contact simultané avec des dispositifs de fixation arrangés radialement (7*j*), où *j* = 3 à *m*, le long du diamètre effectif du produit (1), par quoi tous les dispositifs de fixation (7j) entrent en contact avec leur points de contact correspondants, en éliminant les déviations de la forme cylindrique de la surface latérale du produit (1), après quoi tous les rouleaux imprimeurs (6*i*) de diamètre égal au diamètre du produit (1) entrent en contact simultané avec la surface latérale cylindrique au niveau du diamètre effectif du produit (1), après quoi il se réalise une rotation simultané du produit (1) à une révolution au moyen des dispositifs de fixation (7*j*) qui font cette révolution avec les rouleaux imprimeurs (6*i*) à la même vitesse périphérique dans leur points de contact avec la surface latérale du produit (1), pendant que tous les rouleaux imprimeurs (6*i*) étalent sumiltanément l'empreinte du couleur correspondant (2*i*) sur la zone de couleur de la surface du produit (1) qui correspond à chaque rouleau (6*i*) en accord avec le séparation des couleurs préliminaire, et à la fin de ladite révolution l'image polychrome (3) sur la surface du produit (1) est complètement achevé, après quoi tous les rouleaux imprimeurs (6*i*) ainsi que tous les dispositifs de fixation (7*j*) sont retires de la zone de travail, et après cela pendant l'intervalle jusqu'au prochain chargement de la zone de travail les rouleaux imprimeurs (6*i*) entrent en contact avec les rouleaux transférants (5*i*) afin de couvrir leur relief d'impression avec le couleur d'encre correspondant, et pendant l'intervalle d'impression quand les rouleaux imprimeurs (6*i*) ne sont pas en contact avec les rouleaux transférants (5*i*) les derniers entrent en contact avec les rouleaux in termédiaires (8*i*) qui sont en contact continu avec la surface fournissante des cartouches d'encre correspondantes (4*i*) pour chaque couleur et transmettent l'encre sur les rouleaux intermédiaires correspondants (8*i*) au cours de toute la rotation de chaque cartouche d'encre (4*i*), et pendant tout le temps quand on réalise la rotation de chaque cartouche d'encre (4*i*) l'épaisseur et la régularité de la couche d'encre sur la surface fournissante sont maintenues supplémentairement dans l'intervalle normal par l'étalement oscillant, en fixant rigidement l'essieu d'au moins un rouleau imprimeur (6*i*) en position radiale par rapport au produit (1) pendant l'impression, tandis que les essieus des autres rouleaux imprimeurs (6*i*) réalisent une pliabilité radiale sélective à l'égard de la surface du produit (1).

2. Procédé d'impression des images polychromes sur des surfaces latérales cylindriques non calibrées des produits (1) selon la revendication 1, **caractérisé en ce que** les essieux de tous les rouleaux imprimeurs (6i) exercent une pliabilité radiale sélective à l'égard de la surface du produit (1).

3. Machine à imprimer les images polychromes sur les surfaces latérales cylindriques non calibrées des produits (1), constituée par un rouleau imprimeur (6*i*), une cartouche d'encre (4*i*) fixée à la base de la machine, un rouleau transférant et une rouleau intermédiaire (5*i*, 8*i*), **caractérisée en ce qu'**il y a encore *n*-1 rouleaux imprimeurs (6*i*), cartouches d'encre (4*i*), rouleaux transférants (5*i*) et rouleaux intermédiaires (8*i*) où *n* est le nombre des couleurs (2) de la séparation des couleurs, qu'il y a un magasin flottant vertical (9) au-dessus de la zone de travail et qu'au-dessous de la zone de travail il y a un orifice (10) vers un chenal (11), et qu'une butée mobile ver-

ticale (12) avec une pince à vide (13) à son extrémité supérieure est alignée par rapport de l'axe de la zone de travail et passe par l'orifice (10), en sa position d'extrémité supérieure ladite butée entrant en contact avec le produit (1) par la pince à vide (13), et en sa position d'extrémité inférieure ladite butée étant sous le niveau de l'orifice (10); **en ce que** les rouleaux de fixation (7*j*), où *j* = 3 à *m*, sont arrangés verticalement avec l'axe de rotation parallèle à l'axe de la zone de travail; **en ce qu'**en régime d'impression les rouleaux imprimeurs (6*i*) et les rouleaux de fixation (7*j*) sont positionnés à l'égard du diamètre effectif de la surface latérale cylindrique du produit (1), et que l'essieu d'au moins un rouleau imprimeur (6*i*) est fixé rigidement en position radiale par rapport au produit (1), tandis que les essieus des autres rouleaux imprimeurs (6*i*) réalisent une pliabilité radiale sélective à l'égard de la surface du produit (1), et que les rouleaux imprimeurs (6*i*) ne sont pas en contact avec les rouleaux transférants (5*i*), ces derniers étant en contact avec les rouleaux intermédiaires (8i) qui sont en contact permanent avec la surface étalante des cartouches d'encre correspondantes (4*i*) pour chaque couleur (2*i*), **en ce qu'**en régime de recharge tous les rouleaux imprimeurs (6*i*) ainsi que tous les rouleaux de fixation (7*j*) sont positionnés à l'écart du produit (1), les rouleaux imprimeurs (6*i*) étant en contact avec leur rouleaux transférants correspondants (5*i*) et les derniers n'étant pas en contact avec les rouleaux intermédiaires (8*i*); **en ce qu'**à chaque cartouche d'encre (4*i*) il y a un rouleau oscillant (14) à l'essieu parallèle à l'essieu de la cartouche d'encre (4*i*) et en surface extérieure en contact permanent avec la surface étalante de la cartouche d'encre (4*i*); l'essieu dudit rouleau oscillant (14) étant couplé à l'essieu de la vis sans fin (15) dans un réducteur à vis sans fin (16), dont la roue dentée tangente (17) étant couplée par l'intermédiaire d'un levier fixé excentriquement (18) à un appui (19) du rouleau oscillant (14); **en ce que** l'essieu de chaque rouleau de fixation (7j) est articulé par un coulisseau (20) qui est placé dans un canal (21) formé par des secteurs d'appui (22) et un rouleau guidant (23) fixé à la partie inférieure du coulisseau (20), est placé en un canal guidant (24) dans un disque synchronisé guidant qui tourne (25), dont l'axe de rotation coincide avec l'axe de la zone de travail, et une roue à chaîne (26), fixé au disque synchronisant (25) par une chaîne guidante première (27), est couplé à l'arbre du moteur (28), assurant le mouvement radial des rouleaux de pression (7) en avant et en arrière à l'égard du diamètre effectif du produit (1); en c e que l'essieu de chaque rouleau de pression (7) sous le coulisseau (20) est articulé à l'extrémité intérieure d'un bras (29), l'extrémité extérieure duquel est articulée à un autre bras (30) qui est articulé librement sur un essieu central (31) articulé dans la carcasse de la machine, où ledit essieu central (31) est articulé le long d'un seconde essieu (32), à l'extrémité in férieure duquel il y a deux roues dentées (33) et (34), et à son extrémité supérieure il y a une roue dentée (35), laquelle est couplée par une seconde chaîne à une roue dentée (37) fixée sur l'essieu de la tête imprimeuse (6), **en ce qu'**un moteur de rotation à une révolution (39) est couplé par une troisième chaîne (40) aux roues dentées (33) de tous les secondes essieux (32), les roues dentées inférieures (34) desquels sont couplées par leur quatrièmes chaînes correspondantes (41) aux roues dentées inférieures (42) sur les essieux (43) arrangés le long du essieu dans les essieux (44) des articulations entre les bras ((29), (30)), et des roues dentées supérieures (45) des essieux (43) sont couplées aux cinquièmes chaînes (46) à leur roues dentées correspondantes (47) à l'extrémité inférieure des essieux des rouleaux de fixation (7*j*); **en ce qu'**au moins un essieu central (31) est couplé à la fourchette guidante correspondante (48), dans le canal (49) de laquelle on a placé une goupille (50) positionnée excentriquement par rapport à l'arbre du moteur (51) afin de le mettre en marche; **en ce qu'**à chaque essieu central (31) on a fixé un bras d'appui courbé (52) pour le rouleau imprimeur correspondant (6*i*) articulé dans son extrémité courbé, lesdits bras (52) étant cinématiquement couplés et synchronisés par l'intermédiaire des roues dentées correspondantes (53) fixées aux essieux centrals (31) et entourées par la sixième chaîne (54), **en ce qu'**au-desous de chaque bras d'appui (52) une fourchette d'appui (55) est articulée librement à son essieu central (31), un limiteur de course excentrique (56) étant installé à ladite fourchette, le bras (57) du limiteur de course étant articulé au bras d'appui (52), et un cylindre pneumatique guidant (58) é tant articulé entre ladite fourchette d'appui (55) et ledit bras d'appui (52); **en ce que** la fourchette (59) pour le rouleau intermédiaire (8) et l'appui (19) réalisé comme une fourchette (60) pour le rouleau oscillant (14) sont articulés à ladite fourchette (55) et les rouleaux ((8), (14)) placés au-dessus d'eux sont pressés constamment sur la surface cylindrique de la cartouche d'encre (4) par l'intermédiaire d'un ressort (61) entre la fourchette (59) pour le rouleau intermédiaire (8) et la fourchette (60) pour le rouleau oscillant (14).

4. Machine à imprimer les images polychromes selon la revendication 3, **caractérisée en ce que** tous les essieux centrals (31), entourés par la sixième chaîne (54), sont couplés par ladite chaîne directement à l'arbre du moteur oscillant (51).

5. Machine à imprimer les images polychromes selon la revendication 3, **caractérisée en ce que** toutes les rondelles de courroie crantée (52) des cartou-

ches d'encre (4) sont enserrées par une courroie crantée (63) qui est couplée par un rouleau d'appui (64), équipé d'une roue de courroie crantée (65), avec l'arbre du moteur (66) afin de les mettre toutes en marche.

6. Machine à imprimer les images polychromes selon la revendication 3, **caractérisée en ce que** le magasin chargeur (9) est constituée par des glissières differentes (67*j*) formant un canal vertical (68) et qu'à chaque extrémité de chaque glissière (67*j*) il y a une butée réglable (69), et qu'au moins une de ces glissières est mobile et équipée d'un element guidé (70), la surface intérieure de ladite glissière ayant une saillie (71) de contact avec le produit (1) qui se trouve à la sortie du canal vertical (68).

7. Machine à imprimer les images polychromes selon la revendication 3, **caractérisée en ce que** chaque butée réglable (69) est constituée par un coulisseau (72) d'articulation à la glissière correspondante (67), pressé par un ressort (73) dans un cylindre (74) et supportant par son about une vis d'adjustage (75).

8. Bouchon en liège (1) d'une image polychrome imprimée sur sa surface latérale cylindrique non calibrée, **caractérisé en ce qu'**il est fabriqué par le procédé selon les revendications 1 et 2.

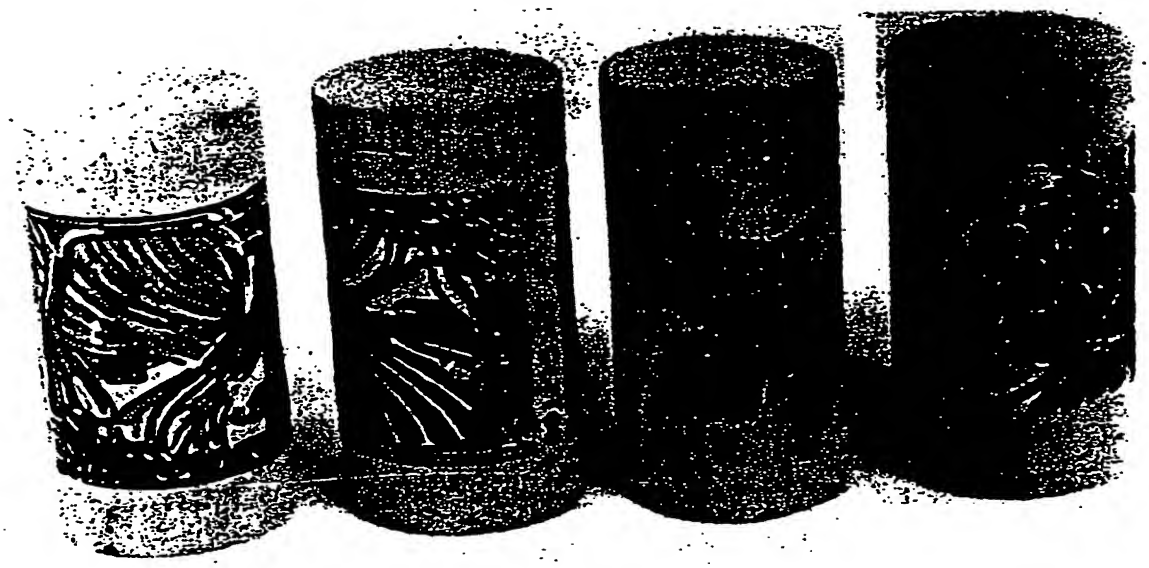

Fig. 1

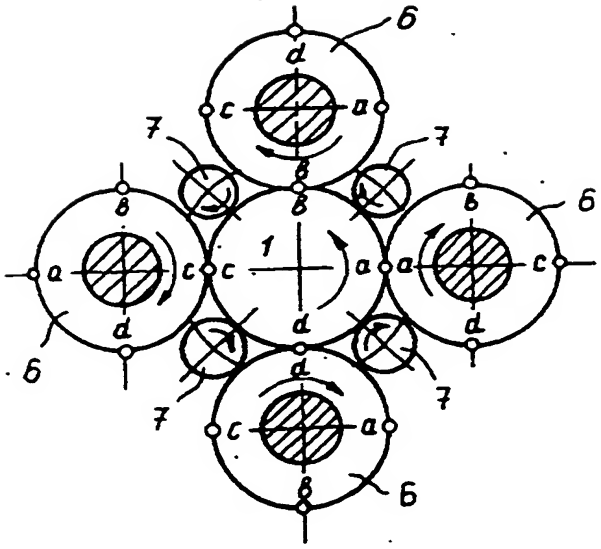

Fig. 2

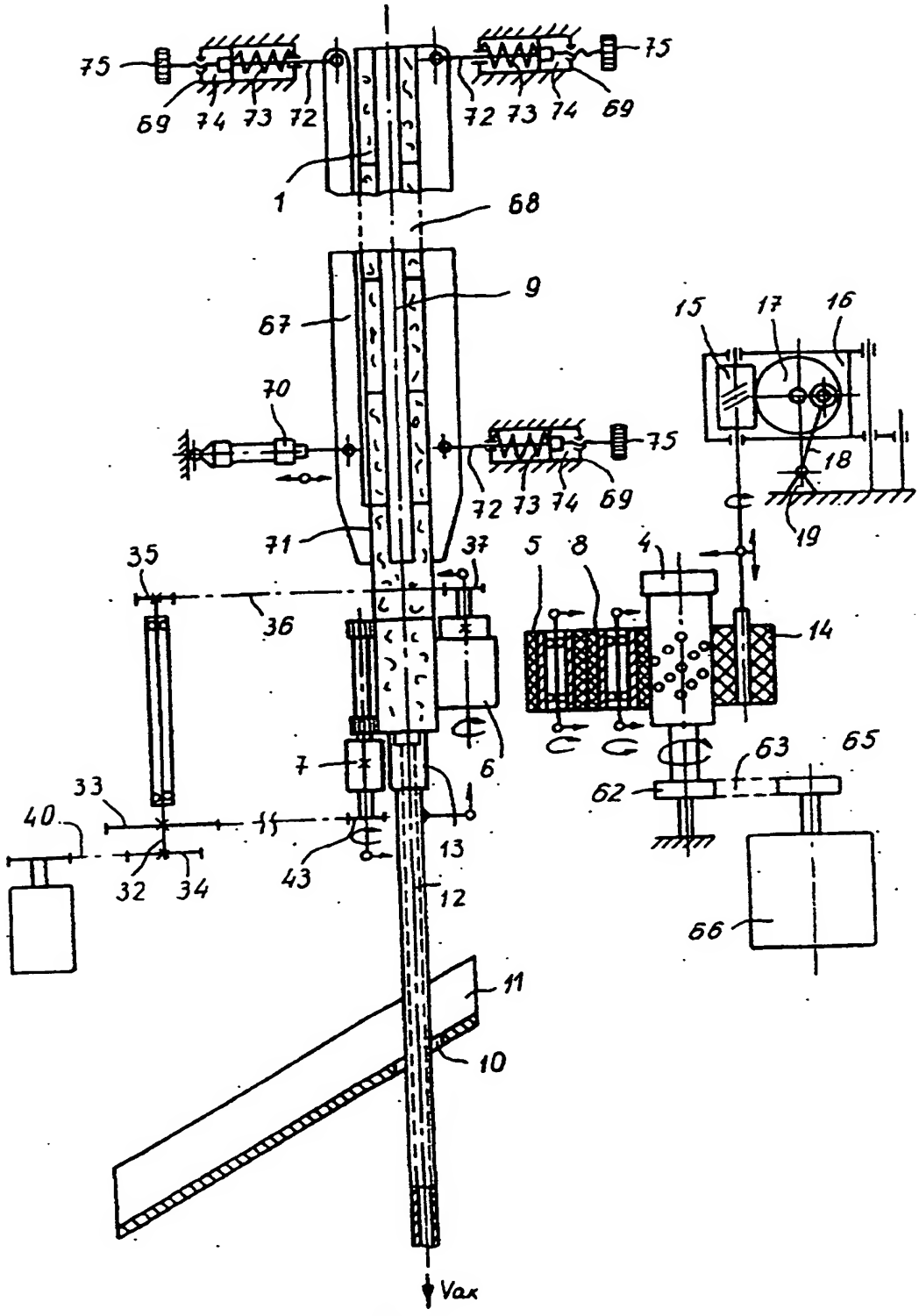
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Fig. 3

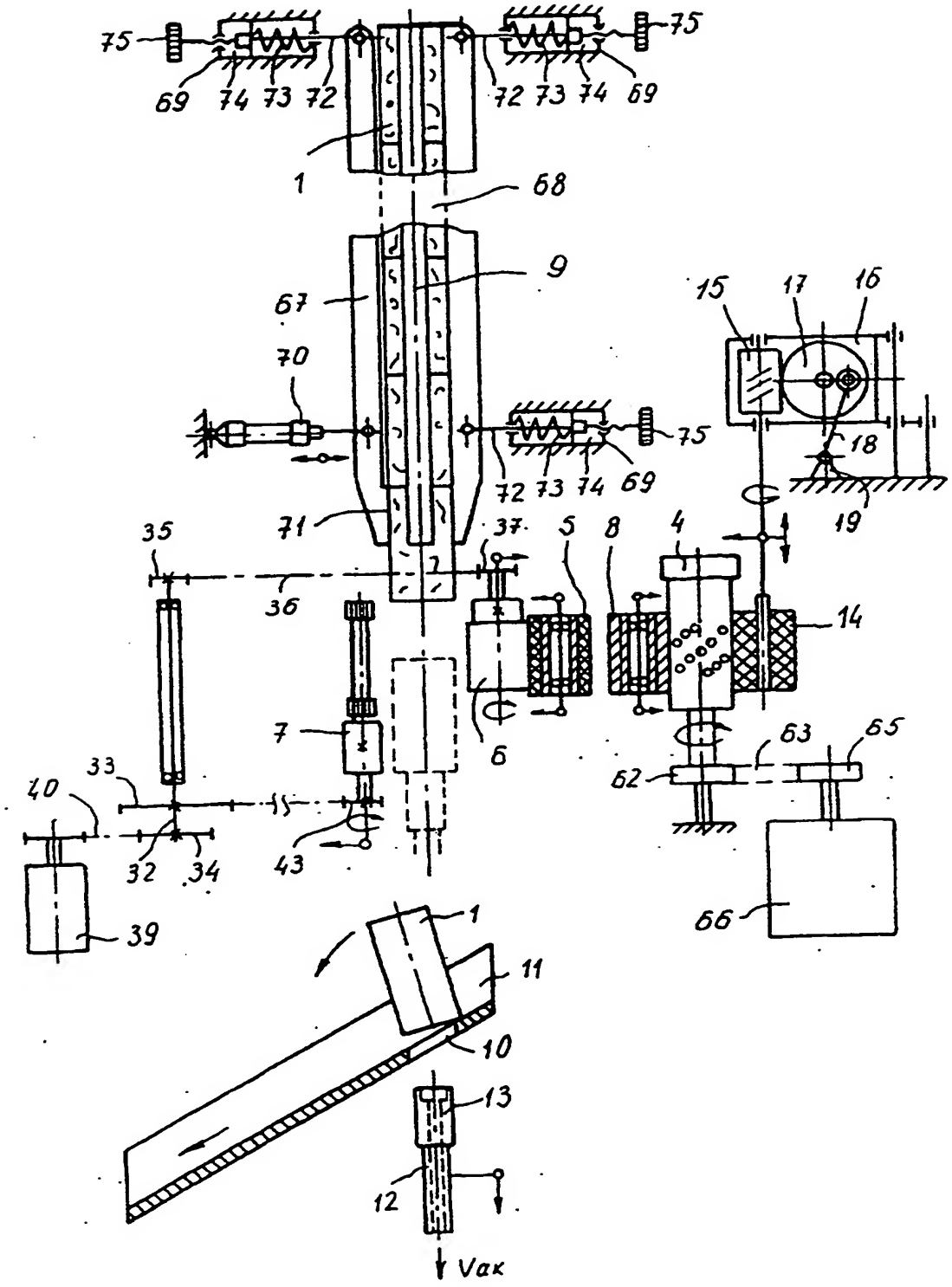
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Fig. 4

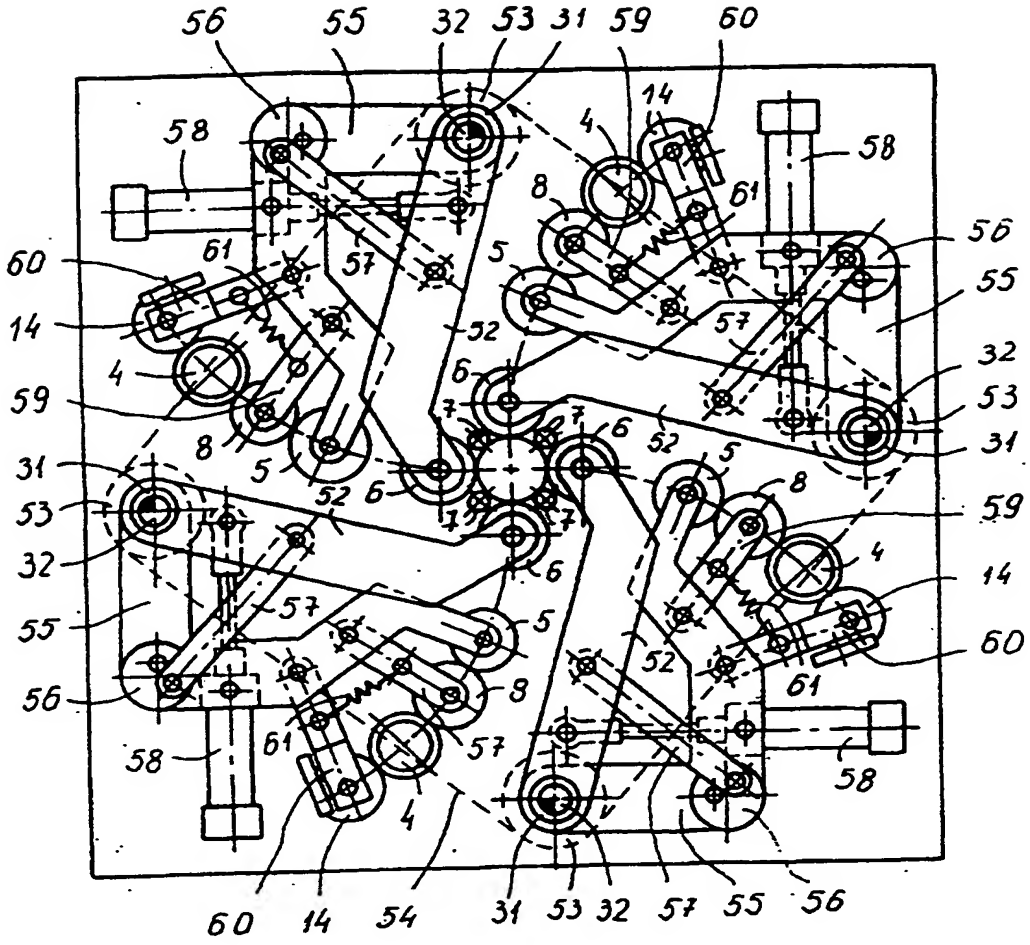

Fig. 5

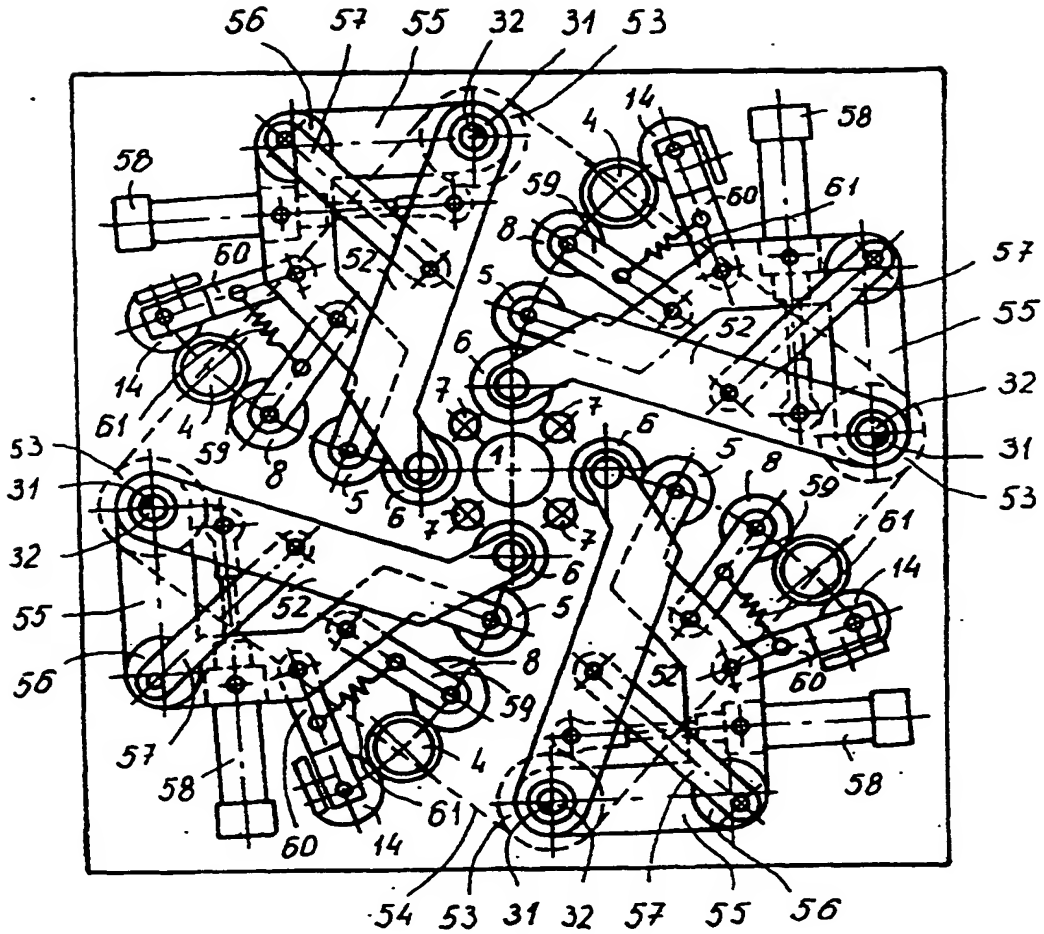

Fig. 6

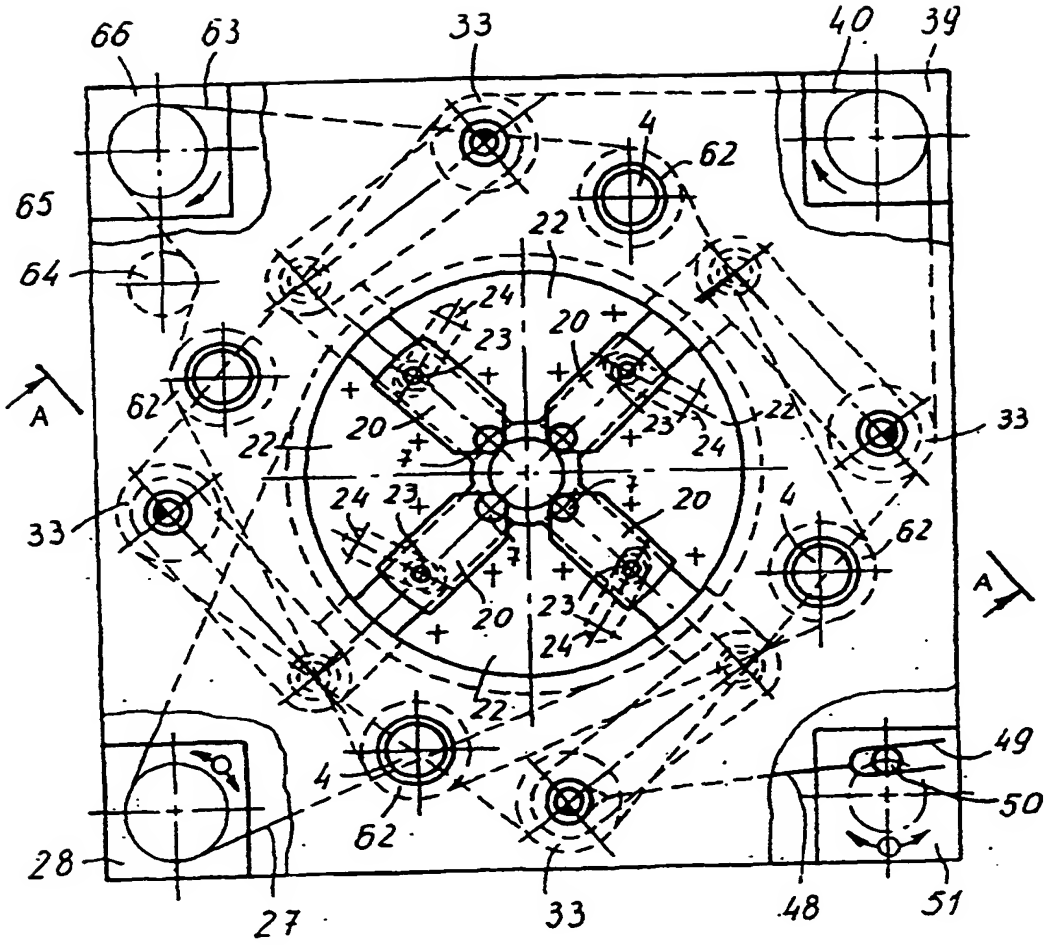

Fig. 7

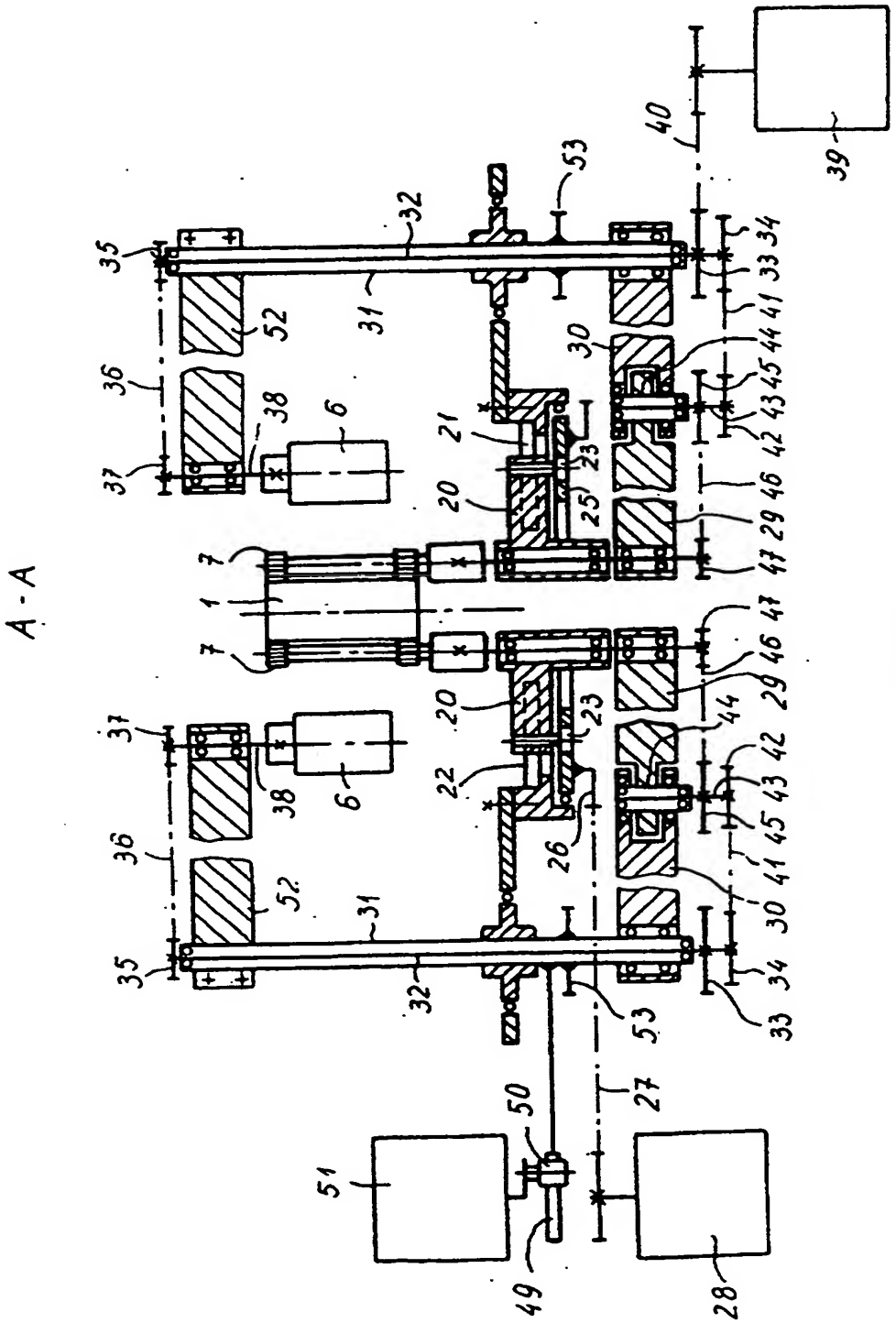
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Fig. 8

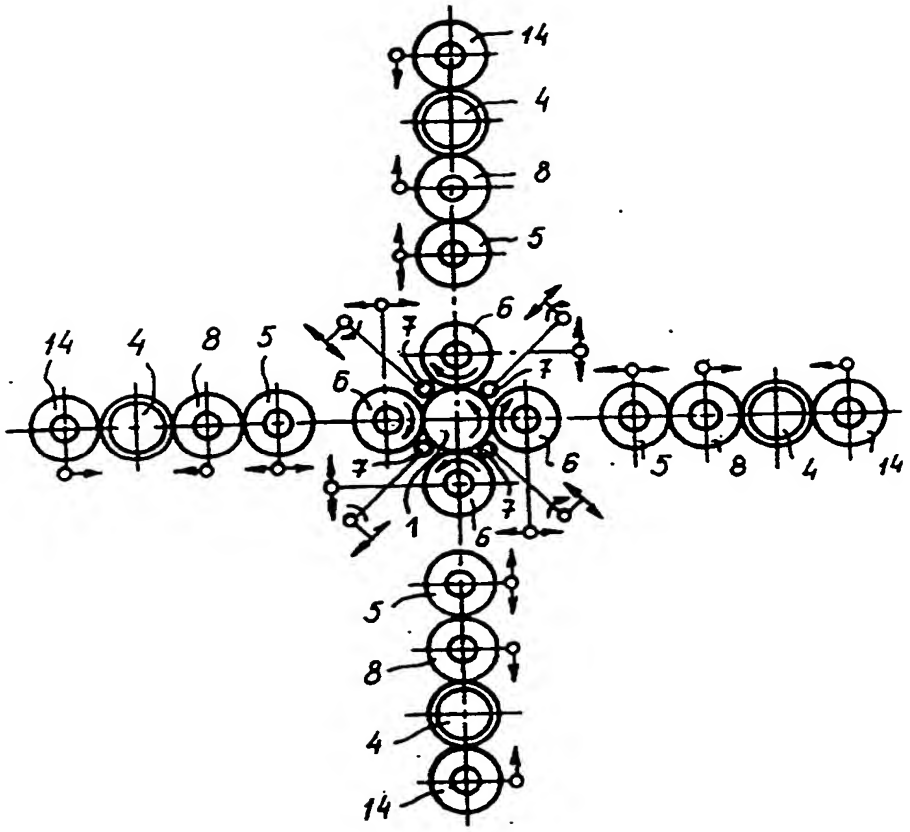

Fig. 9

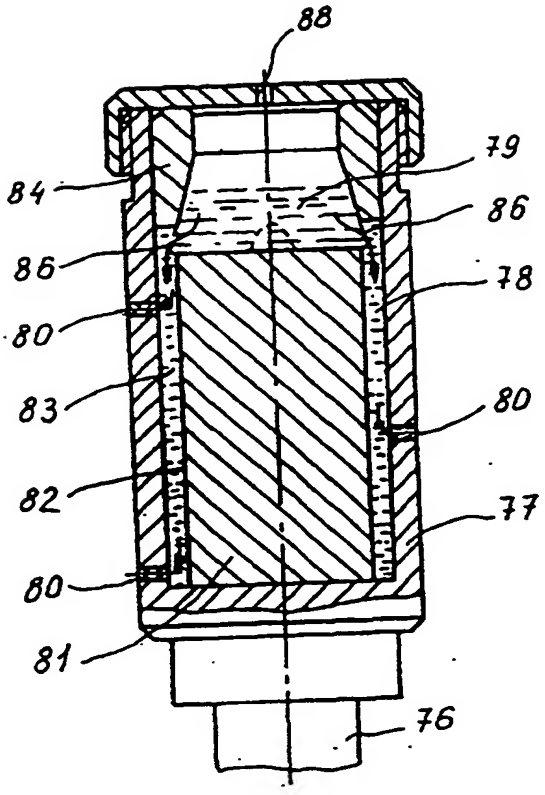

Fig. 10

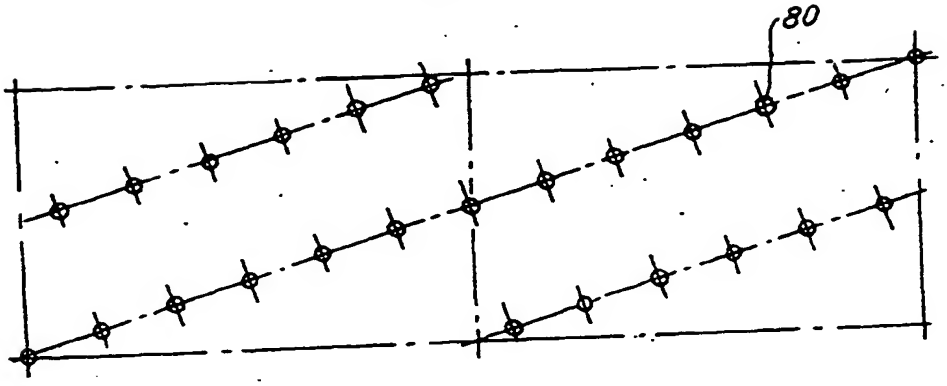

Fig. 11